REMARKS

INTERVIEW — Applicants thank Examiner James A. Thompson
for having extended the courtesy of a telephone interview on
February 22. In the interview, asked whether he felt there
was anything patentable in this case, the Examiner replied in
the negative; however, he did suggest claiming some of the
"specific ways of doing things" taught in the specification.

Examiner and the undersigned discussed very generally the
Curry reference, and Curry's broader prosecution of many hy-
peracuity patents. Also very briefly mentioned was the early
history of this prosecution, particularly the citing of suc-
cessive stations in a newspaper-type offset-litho press as
equivalent to multihundred-element incremental-printing ar-
rays.

AMENDMENT WITH ACCOMPANYING REASONING — In the present Official
Action it appears to be conceded (page 2, third paragraph) —
although very indirectly — that the Applicants' August 2006
amendments have overcome the grounds of rejection asserted in
the April 2006 Action. Applicants thank the Examiner for that
concession.

It appears accordingly that the previous § 102 and 103
rejections are withdrawn. The present Official Action does
not directly articulate that step.

As noted in the August paper, however, those amendments
were offered in the interest of advancing the case toward is-
sue despite the Applicants' principled and well-justified rea-

soning for allowance of the claims as previously standing. In particular the concept of intensity correction was encompassed within those earlier claims, and was only more emphatically clarified (not first introduced) in the August paper.

Applicants revert to this point now, only because in the Official Action it appears to be suggested — at page 2, third paragraph, and page 3 second paragraph — that there was something improper in the Applicants' position, *i. e.* that Applicants were wrong to both amend and simultaneously present reasoning obviated by the amendment. With respect, Applicants submit that such dual presentation is wholly consistent, proper and customary.

More of the same appears in the present paper; Applicants very sincerely hope that it will be found constructive, and acceptable. Such presentation evidences Applicants' willingness to go an extra mile to compromise, in the interest of reaching an equitable resolution. This is so even where the Official Action is deemed — with respect — to wrongly refuse to recognize differences and distinctions between different concepts of printing technology.

COMPATIBILITY — The present Action asserts (near bottom of page 2) that "the proper question is whether . . . Curry and Koike are incompatible". In this framing of one central issue, the Applicants wholeheartedly concur. The present paper is devoted in large part to evidence that those two references are, in fact, incompatible.

MULTIELEMENT HYPERACUITY PRINTING — In the Official Action it is said (bridging pages 2 and 3, emphasis added):

> "Koike has been relied upon to teach aspects of using
> a multi-element printing array. While Koike applies

this teaching in the context of an ink jet printer, <u>there is no reason</u> why the same idea cannot be applied to hyperacuity printing."

Applicants respectfully propose a revision: "no reason other than impracticality, as will be shown below." In the Action, however, it is also said (emphasis added):

"One of ordinary skill would <u>simply</u> be taking an element of technology from one area (inkjet printing) and applying it to another (hyperacuity printing)".

The Official Action goes on to argue that the test for obviousness is not "bodily" incorporation of features from one reference into the other — but rather what the references would suggest to a person of ordinary skill.

The Applicants respectfully submit, and will show quantitatively, that the proposed combination is in fact unfeasible, and this on conceptual grounds — without any effort to "bodily incorporate" features of either technology into the other. Furthermore, this will be true even for an artisan of <u>very highly advanced</u> (not mere ordinary) skill.

When the standard of "ordinary" skill is brought into the question, what is suggested is substantially nothing whatsoever. As will appear clearly, there is nothing "simple" about trying to coadapt inkjet printing and hyperacuity printing.

Furthermore the undersigned considers it entirely possible, even probable, that after a dozen years of intensive patenting efforts, hyperacuity printing has made no appearance in the marketplace at all. This does not speak well for the operativeness of the Curry invention.

In earlier stages of this prosecution, as observed in the telephone interview, multihundred-element printing arrays were equated with a newspaper-type offset lithographic press. Ap-

plicants note here that the same multihundred-element arrays
are now equated with a hypothetical multielement-hyperacuity
printer formed from Curry plus Koike.

Section 103 rejections

CLAIMS 1-9, 11-15, 18, 22-30, 33-42 — It is said in the
Official Action (page 4, emphasis added):

> "Curry discloses . . . means for <u>modifying</u> a multi-
> column, multi-row numerical tabulation that forms a
> <u>mapping</u> between . . . input image data and . . .
> marks . . . to compensate for the measured . . .
> error in image intensity (column 30, lines 32-37
> . . .) . . . (column 10, lines 7-21 . . .)".

A first misstatement in this argument is the idea that Curry
discloses "modifying" a tabulation. What Curry discloses is
<u>not</u> "modifying" a tabulation (in response to measured intensi-
ty error or otherwise), but rather <u>establishing</u> an entire tab-
ulation, from scratch.

NOT MODIFYING — This distinction is key to the Applicants'
innovation, in relation to the known prior art. This point is
specifically discussed in the specification, at page 14, lines
10 through 15.

In Curry, especially at the <u>cited column-10 passage</u> (but
starting at the bottom of column 9 to include the context) the
true character of his procedure comes out (emphasis added):

> "[T]he <u>tone reproduction curve</u> can be <u>embedded into</u>
> <u>the dot definition</u> since only 256 levels (or less)
> need to be represented in the input data. In addi-
> tion, the laser spot shape and size [are] compensa-

ted for. In order to accomplish this, a high fidel-
ity representation of a halftone dot is required."

Hence Curry is not regulating or "modifying" tone values in
response to measurements, certainly not in response to error
measurements — but rather is only assembling a "dot defini-
tion" for each and every one of his 256 levels, thus making it
possible to print tones at all.

Next Curry goes on (now within the cited passage, start-
ing at line 7):

"The definition for the halftone dot, as a func-
tion of spot position on the photoreceptor and the
required gray level is stored in a memory. As the
spot scans, the intensity of the spot will be adjus-
ted by the D to A converter (or any other intensity
modulation scheme such as pulse width modulation or
duty cycle modulation, for instance) by the multi-
bit (gray) output of the halftoner to define the
boundaries of the halftone dots."

Curry's reference to intensity here obviously means the inten-
sity of his flying-spot light beam, not the mark intensity
(intensity of resulting marks) on the photoreceptor or final
print-out page.

> For purposes of this patent application, including
> the claims, the phrase "mark intensity" is now sub-
> stituted for the phrase "individual-element density"
> seen at page 4 in the Applicants' specification, to
> avoid any possible ambiguity in the latter phrase.
> The intended concept, now as initially, is op-
> tical density, or optical intensity, of one or more
> individual marks — as distinct from geometrical
> density (population density) of marks in an array.
> "Mark intensity" shall not be misinterpreted to
> mean intensity of a light beam or other flow of en-
> ergy or material involved in forming such marks.

If desired, Applicants would be glad to insert the foregoing definition into the specification.

Curry's marks are all <u>identical</u> in mark intensity. Specifically they are all dead black if above the xerographic threshold at all. (Of course this example is for a Curry printing element that prints only in black.)

In other words, as the context shows, he is generating the ideal dot for, respectively, each and every macroscopic tonal level <u>and</u> each position on his receptor drum 14 (Fig. 1 of Curry). He is not correcting any measured error in mark intensity. When he modulates the writing beam 13 with image data it is only to select mark size (including selecting <u>no</u> mark) and shape — not to change mark intensity.

<u>NOT RESPONDING TO ERROR MEASUREMENT</u> — Furthermore, as to the other cited passage (in column 30), Curry is not establishing a tabulation in response to measured mark intensity, at all, but rather in response to known skews and offsets in his pixel grid, as Figs. 35 ff. show. Thus for example at the cited passage in column 30 — but again starting at the top of the column to see the context — Curry describes his "registration feedback" feature thus (emphasis added):

> "Referring to Figs. 35 and 36, for . . . registration compensation, linearity and registration controller 78 <u>would</u> supply corrected values to START PHASE register[s] 104 and . . . 116. Register 104 <u>could</u> be updated at the start of every page, or for multicolor printing, at the start of every color layer. Register 116 <u>could</u> be updated at the beginning of each scanline.
>
> " . . . [C]ontroller 78 <u>would</u> supply corrected values . . . <u>as a function of fast scan . . . [and] slow scan position</u>. . . . [T]he corrections <u>may</u> be calculated easily in real time with a counter, accumulator, or simple formula. For [astigmatic] cor-

rection, however, the corrections are nonlinear, and
may require a look-up table".

Four observations can be drawn from these cited passages:

(1)   The tabulations introduced by Curry in the two passages
       (columns 10 and 30) are not the same tabulation, or for
       the same purpose — as each other, although the Official
       Action somewhat appears to mistakenly suggest that they
       are. In column 10 he discusses the dot-definition table,
       for his 256 tonal levels; but in column 30 his topic is
       instead the pixel-grid definition.

(2)   Curry's construction of a tabulation as discussed in col-
       umn 10 appears not to be based significantly on optical
       measurements, of mark-intensity error or otherwise, and
       also not upon any measurements (such as drop detection)
       of marks. Measurement-based initial table construction
       is generally conventional in the art — but not clearly
       seen (by the undersigned) in Curry.

          As far I can glean from Curry's teachings, he con-
       structs his tabulation at least mainly based upon a pri-
       ori geometry required to form dots having respective per-
       cent-coverage areas for each of 256 desired tonal levels.
       These are still all formulated in separate whole tables
       at the outset, rather than modifications of tables al-
       ready in use in the field.

(3)   Corrections discussed in column 30 are based upon misreg-
       istration (fast scan and slow scan position) that is in-
       herent in his system initially and forever, rather than
       any measured mark intensity.

(4) Curry's language throughout is conditional, filled with
     "would", "could" and "may". The significance of this
     fourth point will be explained later in this document.

As to the second point, it does appear that Curry could build
different contrast relationships into these systems of dot
structure to accommodate different rendering intents. They
would still be original and entire compilations, rather than
modifications.

     Thus as to column 30 Curry aims to regularize his pixel
grid, and to an extraordinarily fine degree. This can only be
possible with hyperacuity printing.

     In addition to the issue of "modifying" a tabulation, it
is suggested in the Official Action (bottom of page 12) that
values in Curry's halftone matrix are replaced as specified in
Applicants' <u>claim 18</u>. This misunderstanding appears to arise
from Curry's modification of his so-called "halftone screen"
whenever "linearity and registration control is performed."

     As pointed out earlier, Curry's "linearity and registra-
tion control" are not performed in response to measured mark-
intensity error, but rather in response to detection of pixel-
grid skew etc. Claim 18 depends from claim 9, which recites
that the method includes (emphasis added):

     "deriving a correction pattern from the <u>measured</u>
     . . . error in . . . <u>intensity</u>; [and]

     "applying the . . . correction pattern to modify a
     <u>halftone thresholding</u> process . . . ."

Thus Curry cannot support rejection of the dependent claim 18,
which simply makes it even more specific that this "applying"
step — based clearly on measured mark-intensity error — in-
cludes "replacing values above or below a threshold value."

Moreover, Curry lacks a direct method for correction of
mark-intensity error. As detailed below under the heading
"REFERENCES INCOMPATIBLE", any attempt to follow Curry's instruc-
tions for a plural-printing-element system leads to problems
of poorly fitting interlace slices, in attempting to reassem-
ble signals corresponding to different elements.

Again, what Curry discusses in the above-cited column-30
passage is actually not <u>modifying</u> a tabulation to correct
mark-intensity errors, or for any other purpose. Rather, Cur-
ry is <u>initially creating</u> a tabulation to impose order on the
results of his own positioning system.

Although "modifying" has unquestionably been the clear
thrust of the Applicants' claim language from the outset, nev-
ertheless the claims have now been even further amended to
make crystal clear that what the subject claims cover is modi-
fication only.

Curry seems to make <u>no</u> optical or other measurement of
print-outs (or of marks, or marking colorant or the like) from
his printer. Rather his "measurements" appear to be confined
to checking mechanical conditions of his device — see column
28, lines 33 through 39. He does use such mechanical checks
to regularize his pixel grid and its registration, but not to
correct mark-intensity error.

Applicants hasten to note that pixel-grid imperfections,
such as Curry sets out to correct, can have associated inten-
sity effects. Everything in printing is surely connected with
everything else in printing — but this does not mean every-
thing in printing is equivalent, or the same, or indistingui-
shable from, everything else in printing.

Thus Curry is not fashioning a tabulation, not even a
wholly new tabulation, to influence measured mark-intensity

effects; rather, he is interested in the grid imperfections themselves. As a matter of fact the undersigned believes that Curry does not measure mark-intensity effects.

MISLEADING FOCUS OF ATTENTION UPON POSITION — In the Official Action it is also suggested (bottom of page 4) that Curry has colorant deposition error which is positional, and that Curry's positional error of colorant deposition just straightfor- ardly transforms to intensity error. This is a misinterpreta- tion, which then is compounded in making Curry's positional manipulations seem to be the same thing as the Applicant's mark-intensity corrections.

More specifically, the Official Action argues (emphasis added):

> "By compensating for the colorant-deposition error
> (column 28, lines 33-42 and column 30, lines 32-37
> of Curry), the apparatus also compensates for the
> error in the image intensity, which is affected by
> the colorant-deposition error (column 10, lines 7-31
> of Curry)."

This appears to be a key argument, arising more than once in the present Official Action.

In his columns 28 and 30 Curry is talking only about reg- istration errors — pixel-grid defects, not mark-intensity er- ror. The Action is correct in saying that associated error in image intensity can arise, that is not the same thing as error in mark intensity.

Curry neither measures nor corrects mark-intensity error, at all. This is a fortiore true in regard to the cited passa- ges in his columns 28 and 30.

Perhaps this misunderstanding flows in part from Appli- cants' claim recitation of the word "mapping" — not intended to refer exclusively to relationships of geometry and posi-

tion, but effectively triggering in the Official Actions some of the overbroad associations of the Applicants' invention with positional effects. The claims are now amended in this regard.

Further, Applicants have now clarified that the claims herein address mark intensity, as defined above — not merely gross or macroscopic tonal effects. The claims are amended in this regard too.

Sometimes an incidental side-effect of positional control may include a mark-intensity effect, but incidental side-effects are not the same thing as intentional control of a parameter. Hence incidental mark-intensity change is not the same thing as a system (particularly Applicants' invention) established to modify mark intensity for a specified purpose; all the claims now recite that the invention operates to correct (i. e., for the purpose of correcting) measured mark-intensity error as such.

It has already been shown in the preceding section that Curry fails to modify any tabulation for purposes of mark-intensity correction; however, once again in a spirit of compromise and in the interest of advancing this application toward allowance the Applicants have still further revised the claim language to make even more emphatically clear that:

(1) the "mapping" is not exclusively geometrical or positional, but most pertinently is a correspondence, or relationship, involving mark intensity as defined herein; and

(2) the concept of mark "intensity" is not directed to tonal intensity of image regions, or of arrays of marks, but rather is intensity of individual marks — that is to

say, error in the intensity possessed by one or more marks considered individually.

Thus the Applicants' subject claims are now explicitly narrowed to cover modifying of a [i] preexisting tabulation that establishes an [ii] intensity [iii] relationship or correspondence — and furthermore that this correspondence involves intensity of [iv] individual marks, [v] considered individually.

(Please note that what is being discussed here is the character of the marks whose error is being corrected, not necessarily the character of measurements or of correction. That is to say, the claims are intended to cover many ways to deal with intensity error of individual marks, considered individually — and not all these ways involve measuring intensity of individual marks, considered individually. Likewise, not all these ways involve correcting behavior of individual printing elements, considered individually.)

Further to the quotation above from the Official Action (bottom of page 4), the cited passages at Curry's columns 28 and 30 are not discussing mark intensity. The passage at column 10 is not discussing colorant-deposition error.

COMBINATION OF CURRY AND KOIKE — In the Official Action it is also said (middle of page 5, emphasis added):

> "Curry and Koike are combinable because they
> are from the same field of endeavor, namely the con-
> trol and correction of halftone printing and print-
> heads. . . . [I]t would have been obvious to a
> person of ordinary skill in the art to use a multi-
> element printing array for each respective colorant,
> as taught by Koike. The suggestion for doing so
> would have been that the multi-element printing ar-
> ray taught by Koike is naturally adaptable to color

printing (column 11, lines 38-40 of Koike). Color printing is generally considered in the art to be . . . desirable".

With respect, this argument fails for these independent reasons, any one of which alone is sufficient to overcome the conclusion:

- References are combinable only if they will be seen by a person of ordinary skill.
- References are combinable only if they will be <u>understood</u> by a person of ordinary skill.
- References are combinable only if the principles they teach are functionally compatible (as distinguished from "bodily" incorporation).
- Suggestion and motivation are not enablement.
- References are not combinable if either is inoperative.
- References are not combinable to prove obviousness if, all other things being equal, they have coexisted for a long time without anyone combining them.

Applicants have relatively little quarrel with citation of Koike, which is generally similar to the Applicants' own technology in the area of multielement printing. As pointed out in the August Amendment, however, Koike's image data arrive prehalftoned; thus it is <u>not strictly true</u> that Koike is in the field of "control and correction of halftone printing".

It is understood that Koike is merely cited for the existence of multielement printing in the world; however, if such printing cannot be combined, in a practical sense, with Curry's operating principles, then the combination fails.

As to Curry, now considering in greater detail each bulleted point that appears above, in the same order:

- REFERENCE NOT SEEN — This patent will never be considered
  seriously by anyone involved or interested in true mul-
  tielement printing. The reason is that practical arti-
  sans in the business world give serious consideration
  only to new-technology proposals that are essentially
  within striking range of what those artisans are doing
  already.

  Of course there is an exception for new technology
  that is conspicuously already making a lot of money or
  taking business away from the real-world artisan. As
  will be elaborated below, however, that is hardly true
  for Curry's invention.

  Curry instead sets up an operating environment that
  is totally unlike anything found in at least the real
  world of multielement printing — *e. g.* inkjet printing,
  hot-wax-transfer printing, bubblejet printing and so
  forth. Please recall that the specification in this case
  explicitly defines "multi-" to mean more than <u>ten</u>.

  Therefore, any person skilled in this "real world"
  art (and interested in the present invention) who comes
  across Curry would take one look at Curry's scientific-
  instrumentation-type spinning polygon, mentally visualize
  a system built up of more than ten such devices, and con-
  sider the system requirements (such as the mammoth memory
  demand for multielement implementation). If that person
  can understand Curry, the person will immediately realize
  that Curry has no practical applicability here.

- REFERENCE NOT UNDERSTOOD — Another severe obstacle is that
  Curry is virtually incomprehensible to a person of ordi-
  nary skill — in the real-world art of multielement
  printing. Concededly, a person having intellectual curi-
  osity might pick up the Curry patent and be intrigued by

Curry's proposition that (column 6, lines 38 through 52, emphasis added):

> "It is important to adjust the pixel positions with subpixel or subscan precision . . . because of the <u>ability of the human visual system to perceive edge placement precision [*sic*] 10 to 60 times more precisely [*sic*] than the acuity (resolution) of the visual system</u>. This . . . is referred to as hyperacuity. . . . [T]he printer needs to be able to position the edges of . . . relatively coarse marks with a precision of from 3,000 to 20,000 pixels per inch. It is not practical to implement high speed printers with [such] resolutions . . . so <u>the alternative is to make a scanner with similar characteristics as the human visual system</u> . . . ."

Despite Curry's occasional seemingly careless use of words, in the abstract his idea of matching printer capabilities to those of the humans who will view the printed results has, definitely, a certain theoretical appeal. (Of course this is especially so for Curry himself, who functions in part as a missionary for his very interesting invention.)

Unfortunately, from that point onward the intelligence content in Curry leaves the milieu of the ordinarily skilled person. For example in the same column from line 54 on, Curry next says (emphasis added):

> "It then becomes necessary to provide this scanner with enough fidelity information to drive it. <u>Bitmaps</u>, which are usually used, are a poor source, because they <u>do not efficiently store hyperacuity information</u>."

This mind-bending statement is not explained, but Curry dashes on (emphasis added):

"The information is best provided by <u>gray source data</u>, which can have a limited resolution of 300 to 400 samples per inch, for instance, and <u>a gray depth</u> of perhaps 8 bits, <u>which is logarithmically encoded</u> to achieve 256 levels, <u>which provides the hyperacuity information</u>."

It is certainly not intended to unduly criticize Curry, who appears to be a deep thinker and seems to be trying hard to communicate — but <u>what does it mean</u>? Curry is not finished; he adds perplexingly:

"Thus, this information, which amounts to the equivalent of over 23 million bits per square inch . . . is used only on the photoreceptor or media, not stored in an expensive page buffer."

Curry seems to be assuring us that he can get something for nothing here, *i. e.* that he can somehow store position information in the form of "gray bit depth", and retrieve it too, for use later, and never have to pay for the storage. The person of ordinary skill may wonder whether any of this is at all plausible.

The undersigned, who holds a degree in science from a particularly respected leading school — and who has been prosecuting color-science patent applications for sixteen years — confesses an inability to extract clear information from this text. The undersigned is probably somewhat better equipped than a person of ordinary skill in this field to comprehend such discourse, and respectfully submits that a person of ordinary skill will find it only so much mumbo-jumbo — and will quickly give up on it.

By contrast the lead inventor in the present case, who is a scientist and engineer of truly exceptional ability <u>far</u> beyond the level of an ordinarily skilled ar-

tisan, tells me that he understands it. I do believe
him; however, in his view as detailed below the Curry
invention is not feasible to implement in a modern mul-
tielement printer.

■ REFERENCES INCOMPATIBLE — As mentioned above, the Official
Action asserts that (emphasis added) "there is <u>no reason</u>
why [multielement printing] cannot be applied to hypera-
cuity printing." As explained below, the Applicants sub-
mit — with the greatest respect — that this proposition
is factually in error.

Trying to imagine how a multielement Curry system
might work, a good place to start seems to be Curry's
Fig. 3 and column 7, lines 30 ff. Curry there at least
discusses a <u>two</u>-element system, *i. e.* a system with just
two lasers and two spinning mirror arrays etc.

Curry is most lucid when discussing very simple spa-
tial $(x\text{-}y)$ correction. In the Official Action, however,
as noted above it is proposed that such spatial adjust-
ment "also compensates for the error in the image inten-
sity". It is not plain, however, how this can correct
for mark-intensity variation among printing elements.

How it works depends <u>in detail</u> on how the grayscale
address goes to the halftone table for each element. As
usual, the devil is in the details.

Curry's Fig. 3 is ambiguous as to whether the two
blocks labeled "70" will share a single, common halftone
table (Fig. 27) or whether each will have its own such
table. If they share a common table, then Applicants re-
spectfully submit that there are these alternative possi-
bilities for normalizing the laser diodes to each other:

(a)   placing an adjuster (just like the x and y address
       adjustments) in the grayscale access to the halftone
       memory image (Fig. 27), or

(b)   placing an adjuster in the D/A converter (item 76 in
       Fig. 3) for each printing element.

These adjuster modules would "push up or down" in
intensity, just as the x-y addressing scheme "pushes
right or left". Option "(a)" here, however, would re-
quire yet another table — which would essentially rein-
troduce what Curry attempts to eliminate by adding gray-
scale addressing to the halftone.

That is, it is necessary to perform a linearization
prior to the halftoning. It cannot be accomplished as
part of the halftoning.

This tactic would work very poorly, as the result
necessarily is two <u>different</u> dot images interlaced to-
gether. Visually it is like slicing two differently
shaped/sized objects (eggs, say) and assembling alternate
slices for viewing.

The option "(b)", however, is not clearly workable
at all. It would provide no evident way to correct for
anything but a very simple intensity difference between
the two lasers. In case for example the two beam shapes
were slightly different, how could this mismatch be over-
come?

If instead it is assumed that the two blocks 70 each
have <u>their own separate</u> halftone memory images, then for
a <u>multi</u>element printer the memory requirements quickly
and deeply become intractable. Curry's halftone table is
about 100 kbytes, a reasonably modest amount of memory —
but to provide printing elements in any number at all

comparable with current inkjet printers — *e. g.* 2,000 to 4,000 printing elements, each at 100 kbytes, that would be 200 to 400 Mbytes.

Such a configuration is not practical, either in terms of cost or in terms of generating all those individual halftone tables. The same holds true for the smaller numbers of printing elements recited in certain of the Applicants' claims — and to a certain extent even for a ten-element system.

Still further, a multicolor Curry system would require an entire separate such set of tables for each color. It is not at all clear that the interlaced-dot problem described above for option "(a)" could be avoided.

Conclusion: the references are not compatible, even when approached conceptually as has been outlined.

■ "SUGGESTION" AND "MOTIVATION" ARE NOT ENABLEMENT — The foregoing overall discussion brings home dramatically, but accurately, the hazards of relying on patent clichés such as "mere difference in size or number cannot confer patentability". In keeping with the Applicants' principled reasoning in previous papers, changing anything by an order of magnitude almost always injects mammoth, infeasible dislocations from an initially useful apparatus design. Although somewhat brushed off because of the superficial fact that the Applicants articulated this point through simple analogies, this point remains sharp and true.

The analysis above does not even account for the impracticality of assembling hundreds or thousands of Curry's spinning-polygon scanners to make just a single printer. Yet it is axiomatic that Curry's invention is nothing without hyperacuity, and no cited art "suggests" any way to really make inkjet nozzles — or other such

common multielement-amenable marking units — capable of hyperacuity positioning.

In any event, certain of the claims are now amended to expressly distinguish Curry. Claim 39, for example, recites that the apparatus has printing resolution on the order of 450 marks per inch, and mark-positioning addressability that is the same or less, along at least one axis. The value 450 marks per inch is based on the Applicants' specification, being essentially in the center of the range from 300 to 600 that is discussed exemplarily in the spec.

(The Applicants wish to make plain that for present purposes the phrase "on the order of" means: within one-half order of magnitude above or below a stated value. One-half order, suitably evaluated on a logarithmic scale, is to be taken as a factor of the square root of ten — in other words, a factor of roughly 3.3. Accordingly claim 39 calls for resolution between 450/3.3 and 450 • 3.3, namely 135 to 1500 marks per inch. The claim also thus specifies positioning addressability and precision in that same range, or lower.)

Analogously claim 23 now recites that the printing step proceeds with positioning precision and addressability not amenable to hyperacuity operation. More specifically, the claim recites positioning precision and addressability coarser than the spacing of printing elements along the printing-element array.

Yet another claim now distinguishing Curry is claim 5. Part of the information needed to fully appreciate this is the discussion of halftone-matrix and pen dimensions seen in the Applicants' specification at page 39, lines 6 through 12. As a practical matter, a Curry de-

vice with thirty-two or sixty-four printing elements will
never exist in the real world. Among other impracticali-
ties would be the need to measure errors from thirty-two
Curry devices, to precision of an absolute 1/4800 inch.

Based on Curry's disclosure these characteristics
make each claimed apparatus incapable of hyperacuity ope-
ration. Curry, however, makes plain that his invention
is intimately, inescapably intertwined with hyperacuity.

His invention _is_ hyperacuity. Hence it would be
meaningless to rely upon, say, Koike for nonhyperacuity
operation but at the same time propose a combination of
Koike with Curry to defeat these claims.

- INOPERATIVE — As the Examiner accurately observed during
the telephone interview, Curry has a great many patents
about hyperacuity. All of them, as it appears, are
packed with data such as would be required to build and
operate apparatus according to Curry's hyperacuity prin-
ciples. Moreover, his employer, the Xerox Corporation,
is a firm with very great resources.

Despite these plain facts, or in part because of
them, there are some reasons to intelligently suppose
that Curry's invention does not work, or at least works
very poorly — and even that it has never been built, or
perhaps never made beyond a very rough "proof"-of-concept
breadboard.

One such reason is that the introduction to Curry's
patent expressly makes the case for the invention based
specifically upon economics for the Xerox Corporation.
He says that xerography is giving up a lot of business to
offset-litho and that the reason is image quality.

Those motivations are surely credible. Google-ing
"hyperacuity", however, seems to produce mainly hits re-

lated to <u>patents</u>, and to scattered technical papers about curiosities such as olfactory hyperacuity and "tactile hyperacuity", and some hits related to Curry himself. Foraging on the Xerox Corporation website for hyperacuity production models is fruitless. Equally unrewarded is sending e-mail messages to Xerox with such tantalizing questions as: "Where can I go to see and buy one of your hyperacuity printers?"

Yet Curry's thrust to develop an economic tool in the form of a hyperacuity printer evidently goes back more than fifteen years. Given the aggregate mass of design detail in the many patents of Curry and his colleagues, and the strong likelihood that Xerox is in an economic position to very easily put a hyperacuity machine on the market during any arbitrary three-year period, the suspicion persistently advances itself that the invention fails to live up to its promise.

Perhaps most convincing of all is the absence of marketing campaigns proclaiming that Xerox has now erased its products' longtime subordinate status to offset litho — in terms of image quality or, in particular, image sharpness. Seriously, if the Curry phenomenon were embedded in a product, Xerox Corporation would let us know about it.

Without more information, this contention must remain speculative. The undersigned nevertheless submits that the entire line of "hyperacuity" patents is itself largely speculative.

This is in fact a major significance of the conditional nature of Curry's conditional language ("could", "would", etc.) — as above-mentioned in passing. Curry

sometimes steps out of simple declarative language, presumably because he takes care to be truthful.

The technology is evidently not tempered in the flame of the marketplace. There is no regular hyperacuity-printing workshop put on by a recognized technical society. There is no commercial hobbyist offering — for youngsters who might like to learn about hyperacuity printing.

The undersigned therefore believes that the United States Patent and Trademark Office should refrain from giving generous credence to a technology which has a high probability of being inoperative. This is believed to be particularly inappropriate for purposes of refusing protection to an invention that actually _does_ work, and _is_ real, and _is_ simple and comprehensible, and _does_ confer major advantages, for a product that _is_ on the market.

■ LONG-COEXISTING REFERENCES, AND NEED — Applicants respectfully point out that the Curry and Koike technologies have both been available, at least in theory, to the relevant public — _i. e._ to persons skilled in the art — for a decade. A decade in the computer field is virtually an eon in most fields. As the Courts have said, if it were obvious to combine such references, surely it would have been done by now.

In addition to these issues, the Applicants respectfully reassert for the record the points discussed at considerable length in their August 2006 Amendment, particularly at pages 21 through 27. Certain of those points, such as the fundamental, conceptual incompatibility of inkjet and Curry hyperacuity technologies, remain unresolved.

SPECIFIC CLAIMS — Still with regard to the first claim group identified in the Official Action (top of page 4), the discussions above answer the arguments in the Action through claim 5 (top of page 8).

Several of the claims following claim 5, namely at least claims 6, 8, 12, 14, and 25 ff., were originally directed to compensation for swath-height error and related effects (no longer of particular interest to Applicants). Most of these now are canceled, or amended to instead recite details of mark-intensity correction, pursuant to the foregoing discussion of that topic. The Applicants sincerely regret the need for redirecting these claims at this late date.

Intervening claim 7, and independent claim 9 (with its dependent claims) as well, are among many claims whose language is refined (in this paper), to now specify the mark intensity of individual printing elements, as discussed above — thereby overcoming the grounds of rejection stated at pages 8 and 9.

In the Official Action at page 13, it is suggested that Curry is related to claims 23 and 24. Applicants respectfully point out that — contrary to the assertions in the Official Action — Curry cannot modify the density or mark intensity of any individual mark, and furthermore has no reason or occasion to do so. As explained above, all his marks have equal mark intensity.

Claim 23 has been amended to focus on positioning precision that is not compatible with hyperacuity printing. Further as to claim 24, it has been noted above that Curry makes no mark-intensity measurements; therefore he would be unable to detect a mark "whose density is defective".

Even if Curry did measure mark intensity, it would be pointless because he has no method for feeding such measurement

back into any correction system. Adjusting the grayscale address to his halftone cube would lead to the "sliced egg" problem pointed out earlier.

Likewise as to claim 28 it is said in the Official Action (bridging pages 15 and 16) that Curry uses "a sensing system to measure area-fill non-uniformity". Once again, Curry may measure mechanical conditions that might give rise to such nonuniformity, but doesn't and can't measure such nonuniformity itself. Nevertheless the claim-28 recitation of area-fill nonuniformity has been removed (without prejudice) in favor of other limitations. Claims 29 through 33 are canceled without prejudice.

Comments in the Action (pages 16 through 27) about claims 34 through 42 appear to be moot in view of the Applicants' amendments and foregoing remarks. Applicants have attempted to pick out and respond to all unique issues treated in those twelve pages, but because the text in those pages is repetitive the Applicants are not certain that all specific points in those pages have been answered. Applicants sincerely apologize to the Examiner if any specific point is not answered.

CLAIMS NOT ENUMERATED PREVIOUSLY — In the Official Action it is further said that claims 10, 16, 17, 19 through 21, 31 and 32 are obvious over Curry and Koike in further combinations with Mantell, Klees, Imao or Cobbs. First, the basic rejections founded on Curry plus Koike have been extensively discussed above, and the additional rejections with added references are believed to be inapposite for all the same reasons.

These additional rejections, however, also introduce new considerations:

- In the Official Action it is proposed that adding-in the Mantell patent disposes of claim 10 — which is directed

to _printmasking_. Although printmasking is well known,
this proposed combination of references appears to have a
half-dozen distinct defects.

First, as Mantell does not mention halftoning he can-
not teach using a printmask to decipher addresses to a
halftone table — in order to modify the halftone table as
claimed. At best, the cited Mantell passages describe the
use of a simple, conventional printmask — not use of a
printmask as a reverse lookup table of halftone cell ad-
dresses as claimed.

Possibly, on this point, in the drafting of the Offi-
cial Action there was some confusion of "halftone matrix"
with "halftoned image data". The latter are universally
sent through a printmask when such a mask exists.

Second, such reverse-lookup use of a printmask is _not_
at all common in the art. In fact, conventional wisdom in
this field is to _refrain_ from constructing a halftone ma-
trix to have a direct repeatable correspondence with the
printmask or the printing elements. This precaution is
taken, for example, to avoid generating banding or "worms"
in the output image. Accordingly, this repeating corre-
spondence, to facilitate the claimed reverse-lookup fea-
ture discussed above, is believed to be distinctively part
of the present invention only.

Third, Mantell teaches nothing at all about correct-
ing a halftone matrix — not in column 10, or anywhere in
Mantell. Hence, with respect, the Official Action at pa-
ges 27 and 28 appears to be in error.

Fourth, it is also said in the Action that Mantell's
printmasking is an appealing feature for combination with

Curry, because multipass printmasking will help ink to dry faster.

One of the key reasons, however, for modifying the halftone matrix according to the present invention is to _reduce_ the number of print passes needed to hide imperfections in the printing array. That is discussed in the Applicants' specification at page 44, lines 12 through 24 (particularly 15 through 17). Using a multipass printmode to hide imperfections is a slower and inferior solution for high-speed printing.

Fifth, one purpose of printmasking conventionally, as stated accurately in the Official Action, relates to _drying of ink_ between passes — but Curry uses xerography and thus has no ink to dry. Therefore the purported ink-drying "motivation" fails.

Sixth, it is said in the Action that Mantell's printmasking will hide "printhead signature". Curry, however, intimates that his system substantially eliminates variations in printing (this presumably makes "printhead signature" obsolete without need for a Mantell add-on). Hence the purported printhead-signature-suppression fails too.

- In the Official Action it is also argued that combining Klees with Curry/Koike will make obvious the Applicants' _claims 16 and 17_, which deal with _error diffusion_.

These two claims expressly recite measurement of mark-intensity error — but none of the references teaches such measurement. Klees, in particular, does no more than read the incoming image data stream to perform his error-diffusion protocol.

- In the Official Action it is still further asserted that the Applicants' <u>claims 19 through 21</u> are obvious in view of Curry/Koike in combination with Imao. More specifically it is said that the application of certain arithmetic or algebraic steps to <u>image data</u> in Imao is related to Applicant's recited method.

  These claims, however, recite arithmetic or algebraic corrections to the <u>threshold-matrix</u> values, not to the image data. This is clear from claim 9, as the Applicants have already pointed out in the claim-18 discussion above at pages 31 and 32.

  Even if this were not so, the Imao patent would be irrelevant here since it deals with color separation. That process precedes and is distinct from halftoning.

- In the Official Action it is also said that Applicants' claims 31 and 32 are obvious over Curry/Koike considered together with Cobbs. Applicants respectfully disagree, but for different reasons (and without prejudice) have cancelled those claims.
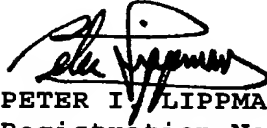
Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request the Examiner's favorable reconsideration and allowance of all the claims now standing in this case.

It is respectfully requested that, should there appear any further obstacle to allowance of the claims herein, the Exam-

iner telephone the undersigned attorney to try to resolve the obstacle.

Respectfully submitted,

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